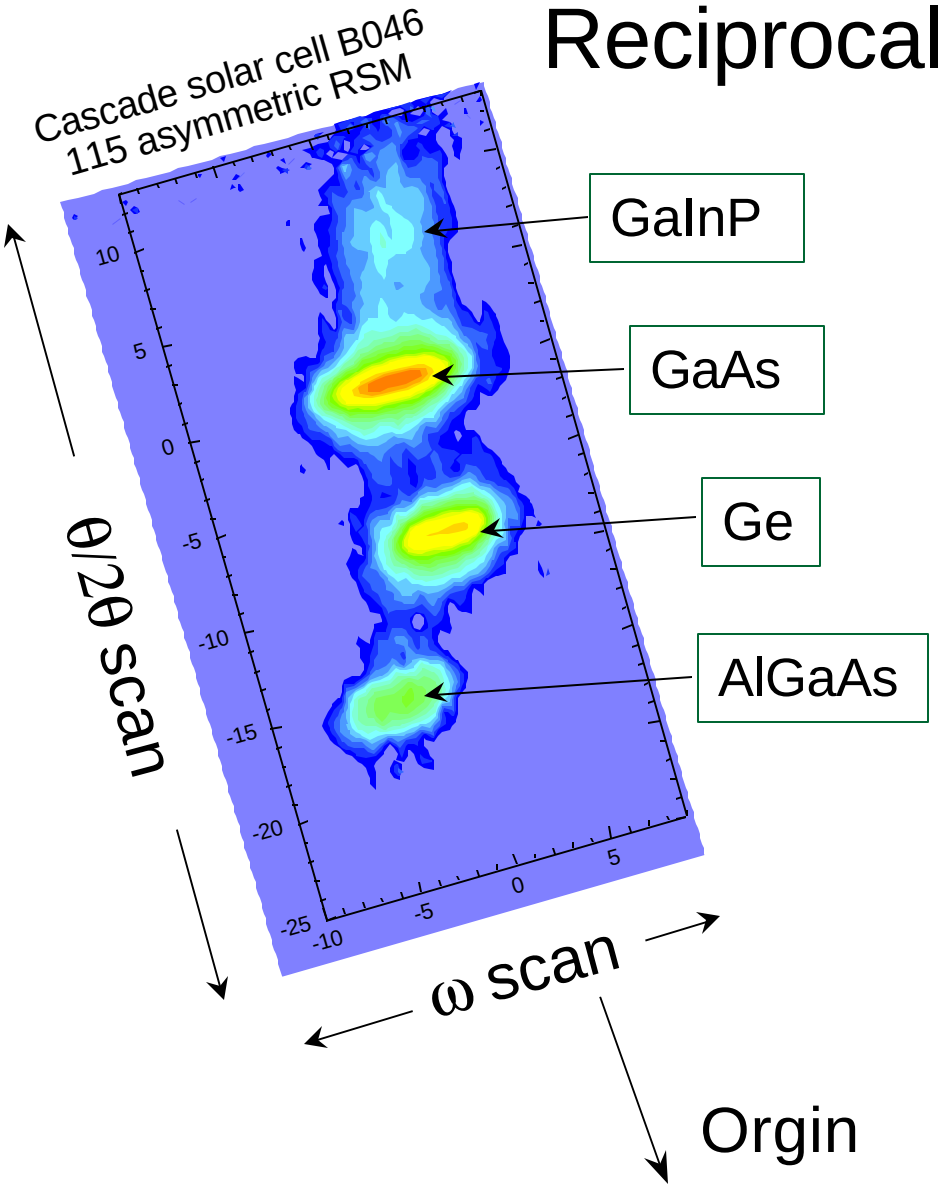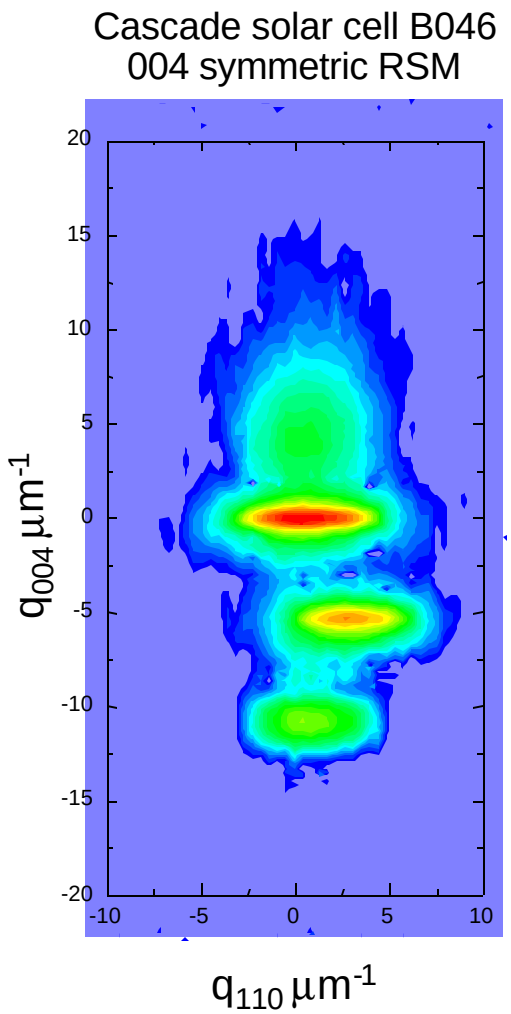Mapping the Heterostructure in Reciprocal Space